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Letter to the Editor

Higher Polyunsaturated Fatty Acid to Saturated Fatty Acid Ratio Is Associated With Cognition, Mobility, Nutrient Intakes, and Higher Diet Quality in Heterogeneous Older Populations

*To the Editor:*

Longitudinal studies suggest that nutrition plays an important role in healthy aging.¹ As people age, eventually they become less active, their metabolism slows, and energy requirement and dietary intake decrease.² At the same time, nutrient requirements may even increase as the ability to absorb and utilize many nutrients becomes less efficient, thus maintaining a nutrient-dense and high-quality diet is very important for the health of older individuals.² Research has demonstrated that sufficient nutrient intake and diet quality has a huge effect on physical and cognitive functioning, cardiovascular, and immune systems.² For the prevention of coronary heart disease, a diet with high polyunsaturated fatty acids to saturated fatty acids (PUFA/SFA) ratio has been recommended.³ How fat quality is associated with mobility, cognition, nutrient intake, and overall diet quality in older people has not been thoroughly studied. Therefore, we analyzed PUFA/SFA ratio and its associations with mobility, nutrition, and cognition in heterogeneous groups (home-dwelling and institutionalized) of older people.

Methods

This cross-sectional study combined five data sets of nutritional studies: (1) healthy home-dwelling older people who participated in the Nutrition Education and Cooking Class (NC) follow-up study ($n = 54$); (2) older men from the Helsinki Businessmen Study (HBS) ($n = 68$); (3) home-dwelling older people with signs of frailty and screened for the Porvoo Sarcopenia and Nutrition Trial (PSNT) ($n =$

208), (4) home-dwelling older people with Alzheimer disease and their spousal caregivers ($n = 196$), and (5) institutionalized older residents of assisted living facilities (ALF) from the Helsinki metropolitan area ($n = 374$).^{4–8} The recruitment, eligibility, and participant characteristics have been reported elsewhere.^{4–8} Nutritional status was assessed using the Mini Nutritional Assessment (MNA) tool, and energy and nutrient intakes retrieved from 1- to 3-day food records.⁹ Cognition was measured using either the Mini Mental State Examination and/or the Clinical Dementia Rating (CDR), (range 0–3).^{10,11} The participants were divided into quartiles (Q1–Q4) corresponding to their PUFA/SFA ratios. Their background characteristics, Mini Mental State Examination, Clinical Dementia Rating, and MNA, energy, nutrient, and fiber intakes were classified according to the PUFA/SFA ratio quartiles. All of the study protocols were approved by the Ethics Committee of Human Sciences of the University of Helsinki or by the Helsinki University Central Hospital Ethics Committee.

Results

Mean age of the participants was 81 years, and 66% ($n = 591$) were women (Table 1). Of the institutionalized participants, 80% were classified into the lowest PUFA/SFA ratio quartiles (Q₁ and Q₂). Overall, age was not associated with PUFA/SFA ratios, but in home-dwelling participants it was linearly associated with PUFA/SFA ratios. Higher PUFA/SFA ratios were linearly associated with mobility, education, cognition, and body mass index. MNA scores were lowest in Q1 and highest in Q3. Energy intakes were not associated with PUFA/SFA ratios; however, protein, fiber, and micronutrient intakes were positively, and total carbohydrate and sugar intakes were inversely, associated with PUFA/SFA ratios. When home-dwelling and institutionalized participants were observed separately, dietary intakes of vitamins C and D, folate, iron, and magnesium intakes were linearly associated with higher PUFA/SFA ratios in both groups. Moreover, among home-dwelling participants energy, carbohydrate, vitamin D, thiamin, niacin, and iron intakes as well as Mini Mental State Examination score, mobility, and education were associated with PUFA/SFA ratios, whereas the MNA scores were inversely associated with PUFA/SFA ratios. In institutionalized participants, PUFA/SFA ratios were linearly associated with MNA scores, vitamin A, protein, and fiber intakes.

Conclusion

Higher PUFA/SFA ratios were associated with several positive characteristics of older people, including better mobility, cognition, nutrient intake, and diet quality. Institutionalized participants' diet had low fat quality and nutrient density compared with home-dwelling participants. There is a need to further improve the diet quality and nutrient density of the diets of institutionalized older people. Furthermore, encouraging home-dwelling older people to

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Table 1
Characteristics of Older People and Dietary Energy, Nutrient, and Fiber Intakes According to Their PUFA/SFA Ratio

	Q1 PUFA/SFA 0–0.27 (n = 225)	Q2 PUFA/SFA 0.27–0.41 (n = 225)	Q3 PUFA/SFA 0.41–0.67 (n = 225)	Q4 PUFA/SFA >0.67 (n = 225)	P Value*
Age, mean (SD)	83 (7)	80 (8)	79 (8)	82 (6)	.082
Sex, female %	76	64	64	59	.002 [†]
Place of residence, %					
Home	18	50	72	94	<.001 [‡]
Institution	82	50	28	8	
Mobility, %					
Bed/chair bound or does not go out	53	30	18	3	<.001 [‡]
Goes out	47	70	82	97	
CDR, %					
0 or 0.5 = no definitive dementia	24	43	58	68	<.001 [‡]
1 = mild dementia	16	13	14	26	
2 = moderate dementia	30	29	22	5	
3 = severe dementia	30	15	6	2	
Education, %					
1 = primary school	49	49	36	37	<.001 [‡]
2 = high school	36	35	42	33	
3 = university or higher	15	16	22	31	
MNA, mean (SD)	20.6 (4)	22.7 (4)	23.8 (3)	23.0 (3)	<.001
BMI, mean (SD)	25.1 (4.6)	25.8 (4.3)	26.4 (4.6)	27.0 (4.2)	<.001
MMSE, mean (SD) (home-dwelling)	23.4 (6.5)	24.6 (5.6)	24.9 (5.1)	26.4 (3)	<.001
Energy, kcal, mean (SD)	1643 (437)	1673 (447)	1679 (453)	1716 (452)	.092
Carbohydrates, total, g, mean (SD)	212 (65)	201 (62)	198 (61)	194 (60)	.002
Sugar	65 (34)	49 (30)	42 (25)	37 (21)	<.001
Fiber	15 (6)	18 (7)	20 (9)	20 (7)	<.001
Protein, g, mean (SD)	60 (19)	69 (22)	70 (24)	73 (22)	<.001
Vitamin A, µg, mean (SD)	682 (737)	866 (905)	1086 (1444)	1101 (1296)	<.001
Vitamin D, µg, mean (SD)	6 (5)	8 (6)	10 (9)	11 (8)	<.001
Thiamine, mg, mean (SD)	1.1 (0.4)	1.2 (0.4)	1.2 (0.4)	1.3 (0.4)	<.001
Vitamin C, mg, mean (SD)	90 (63)	94 (50)	100 (61)	109 (66)	.001
Folate, µg, mean (SD)	208 (82)	229 (79)	257 (112)	275 (145)	<.001
Iron, mg, mean (SD)	8 (3)	9 (3)	10 (3)	11 (4)	<.001
Zinc, mg, mean (SD)	9 (3)	10 (3)	10 (3)	11 (3)	<.001

Abbreviations: BMI, body mass index; CDR, Clinical Dementia Rating¹⁰; MMSE, Mini Mental State Examination¹¹; Q, quartile; SD, standard deviation.

*Tested for linearity.

[†]Tested by χ^2 test.

[‡]Tested by Mantel-Haenszel test of trend.

consume good-quality diets as described in Nutritional guidelines may be helpful for maintaining their cognitive health and sufficient nutrient intakes.

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